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(54) SEMICONDUCTOR DEVICEITS MANUFACTURE AND MANUFACTURING EQUIPMENT OF SEMICONDUCTOR DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a highly versatilehighly reliable small-sized semiconductor device at low cost and a manufacturing equipment and a manufacturing method which are used for manufacturing the device.
SOLUTION: In this semiconductor deviceinput of an electric signal from an external part to electrode pads 1a on a semiconductor element 1 is performed only by metal leads 2. The section of the metal lead 2 is almost circular. A metal lead whose diameter is 50-100 μm is used as the metal lead 2corresponding to a gap of the electrode pads 1a and a desired package size. For the main material of the metal lead 2besides Au and Al Ag and Cu can be used. For the metal lead 2not only a metal lead single body but also the following may be used: a member whose surface is covered with a low-melting point solder materialand a member wherein the surface is covered with an insulating material in order to increase insulating properties between the mutual metal leads 2 and between the metal lead 2 and the semiconductor element 1.

CLAIMS

[Claim(s)]
[Claim 1]A semiconductor device having a wrap sealing agent for a part of a semiconductor device which has an electrode pada metal lead by which an end was connected to the above-mentioned electrode padabove-mentioned semiconductor deviceabove-mentioned electrode padand above-mentioned metal leadand performing an electrical link with the exterior in the above-mentioned metal lead.
[Claim 2]The semiconductor device according to claim 1wherein the section of a metal lead is almost circular.
[Claim 3]The semiconductor device according to claim 1 or 2wherein a metal lead covers a metal core wire of high conductivity with low melting point wax material.
[Claim 4]The semiconductor device according to any one of claims 1 to 3 with which a metal lead is characterized by covering the outermost layer side with pre-insulation material.
[Claim 5]The semiconductor device according to any one of claims 1 to 4 covering a part of metal lead with an insulation material of thickness as for which size becomes rather than a diameter of the above-mentioned metal lead.
[Claim 6]The semiconductor device according to any one of claims 1 to 5wherein a metal lead is arranged along the side of a sealing agent and the part is being embedded and fixed to the above-mentioned sealing agent.
[Claim 7]The semiconductor device according to any one of claims 1 to 4wherein a metal lead had a metallic bump at the tip and the above-mentioned metallic bump has exposed it outside from a sealing agent.
[Claim 8]A semiconductor device which has an electrode pada metal lead by which an end was connected to the above-mentioned electrode padA part of above-mentioned semiconductor deviceabove-mentioned electrode padand above-mentioned metal lead are coveredA semiconductor device provided with a terminal area which is vertically arranged to the above-mentioned wiring board side on the side of a hole of a sealing agent in which the above-mentioned metal lead has been arranged along the sidea wiring board which has a hole which inserts in the above-mentioned semiconductor device and is fixedand the above-mentioned wiring boardand is connected with the above-mentioned metal lead.
[Claim 9]The semiconductor device according to claim 8wherein a wiring board holds connection between a metal lead and a terminal area in an attachment component which consists of material of a rate of low thermal expansionand a rate of high elasticity.
[Claim 10]The semiconductor device according to claim 9wherein an

attachment component is widely connected on a wiring board and a semiconductor device.
[Claim 11]Cover a metal core wire of high conductivity with low melting point wax materialand further the outermost surface at the end of a metal lead covered with pre-insulation material. A process of irradiating with laser of a wavelength band which does not give a damage to the above-mentioned low melting point wax material and a metal core wireand removing the above-mentioned pre-insulation materialA manufacturing method of a semiconductor device including a process of joining the above-mentioned electrode pad to an end which carried a semiconductor device which has an electrode pad in a chip carrier which has a part holding other ends of the above-mentioned metal lead which can be soldered and from which pre-insulation material of the above-mentioned metal lead was removed with a wire bond device.
[Claim 12]Using a chip carrier which has the projection for cutting a metal leadwhere a semiconductor device is carried in this chip carrierA manufacturing method of the semiconductor device according to claim 11 including a process of cutting the above-mentioned metal lead by which one end was connected to an electrode pad of the above-mentioned semiconductor deviceand the other end was connected to a part of the above-mentioned chip carrier which can be soldered using a cutting tool with which the above-mentioned projection and a wire bond device were equipped.
[Claim 13]A chip carrier which has mutually disengageable semiconductor mounting parts and a part which can be soldered is usedA manufacturing method of the semiconductor device according to claim 11 or 12 including a process of heating only the above-mentioned part which can be soldered after using the above-mentioned chip carrierperforming removal of a metal lead and flattening of the above-mentioned part which can be soldered which remainedand performing defecation by plasma further.
[Claim 14]Connect with an electrode pad on a semiconductor deviceand a metal lead The above-mentioned semiconductor deviceA process of closing a part of above-mentioned electrode pad and above-mentioned metal lead with a sealing agent which is thermoplastic resinA manufacturing method of a semiconductor device including a process which embeds a part of process of fabricating the above-mentioned metal lead in the above-mentioned sealing agent exterior with a metal lead bending metallic mold so that the side of the above-mentioned sealing agent may be metand above-mentioned metal leadinto the above-mentioned sealing agent with a metallic mold which can be heatedand is fixed.
[Claim 15]A process which heats a wiring board which has a hole which

mounts a semiconductor device and to which the above-mentioned hole is expandedA manufacturing method of a semiconductor device including a process of joining a metal lead arranged on the side of the above-mentioned semiconductor device to a terminal which inserted a semiconductor device in the above-mentioned holeand has been arranged on the side of the above-mentioned holeand a process which cools the above-mentioned wiring board after the above-mentioned semiconductor device mountingand shrinks the above-mentioned hole.
[Claim 16]A metal sphere is formed at a tip of a metal lead joined to an electrode pad of a semiconductor deviceThe above-mentioned semiconductor devicethe above-mentioned electrode padand the above-mentioned metal lead with a sealing agent A wrap processA manufacturing method of a semiconductor device including a process of removing the above-mentioned sealing agent by laserexposing a metal sphere at the above-mentioned tip of a metal leadand defecating the above-mentioned metal sphere surfaceand a process of arranging height of the above-mentioned metal sphere using a leveling tool.
[Claim 17]It is a device which joins a metal lead arranged on the side of a terminal which inserted a semiconductor device in a hole established in a wiring boardand has been arranged on the side of the above-mentioned holeand the above-mentioned semiconductor deviceA manufacturing installation of a semiconductor device provided with a stage which has a heating machine style for holding the above-mentioned semiconductor devicecarrying a bonding head and the above-mentioned wiring board which have heatingapplication of pressureand an ultrasonic impression mechanismperforming positioning with the above-mentioned bonding headand making a hole of the above-mentioned wiring board expand.
[Claim 18]A manufacturing installation of a semiconductor device provided with laser which cuts a stage in which a semiconductor device is carrieda bonding tool which joins a metal lead to an electrode pad of the above-mentioned semiconductor deviceand the above-mentioned metal leadand forms a metal sphere in an amputation stump by the side of the above-mentioned semiconductor device at least.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the plastic package represented by QFP (Quad Flat Pack) especially a micro semiconductor

deviceits manufacturing installationand its manufacturing method.
[0002]
[Description of the Prior Art]Drawing 21 - drawing 25 are the figures showing the composition of the conventional typical package. In a figure1 a semiconductor device and 3 a sealing agent and 28 An inner lead29 and 31 -- an electrode padand 30 and 36 -- a lead and 32 -- UBM (Under Bump Metal)and 3335 and 39 -- a die-bonding part and 38 show a metal baseA shows the width of a semiconductor deviceandas for a vamp and 34B shows the width of a packagerespectivelyas for a wiring board and 37. In the package using the conventional leadframeas shown in drawing 21the width B of a package becomes large to the width A of the working limit of the inner lead 28 to the semiconductor device 1. Drawing 22 is the package which used the TAB tape.
The pattern of the lead 30 is prepared according to arrangement of the electrode pad 29 on the semiconductor device 1.
As shown in drawing 23after forming UBM32 on the electrode pad 31with the package which forms the vamp 33 with platingit is necessary to form the vamp 33. As shown in drawing 24in the topology using the vamp 35it is easy to generate stress by the vamp 35 by the thermal expansion of the wiring board 34and contraction. In JP3-94459Aas shown in drawing 25the package structure to which the vamp 39 arranged on the metal base 38 formed in the sealing agent 3 exterior and the semiconductor device 1 are connected by the metal lead 36 is proposed.
[0003]
[Problem(s) to be Solved by the Invention]There are the following problems in the conventional package constituted as mentioned above. Firstin the package using the leadframe shown in drawing 21a miniaturization of sufficient package cannot be expected from the working limit of the inner lead 28. In the package using a TAB tapeas shown in drawing 22 (a) and (b)when arrangement of the electrode pad 29 of the semiconductor device 1 differsit is necessary to prepare the pattern of the lead 30 corresponding to eachand lacking in flexibility. It is necessary to form UBM32 in the electrode pad 31 surfaceand the semiconductor device generally used cannot be used in the method of forming the vamp 33 with plating shown in drawing 23. In the topology using a vampas shown in drawing 24it is easy to generate stress by the vamp 35and the stability of connection is low and there is a problem in reliability. In the package shown in drawing 25 proposed by JP3-94459Athe manufacturing process is complicated compared with the former and there is a problem that cost reduction is difficult.
[0004]This invention was made in order to cancel the above problemsand

it is flexibleand the cheap and small semiconductor device which has high reliabilitythe manufacturing installation for manufacturing thisand a manufacturing method are provided.
[0005]
[Means for Solving the Problem]A semiconductor device concerning this invention is provided with a wrap sealing agent for a part of semiconductor device which has an electrode padmetal lead by which an end was connected to an electrode padand a semiconductor devicean electrode pad and a metal leadand performs an electrical link with the exterior in a metal lead. A metal lead is taken as a thing in which the section is almost circular. A metal lead covers a metal core wire of high conductivity with low melting point wax material. As for a metal leadthe outermost layer side is covered with pre-insulation material. It is a wrap thing in an insulation material of thickness as for which size becomes rather than a diameter of a metal lead in a part of metal lead. A metal lead is arranged along the side of a sealing agentand the part is being embedded and fixed to a sealing agent. A metal lead had a metallic bump at the tipand a metallic bump has exposed it outside from a sealing agent.
[0006]A semiconductor device which has an electrode pad and a metal lead by which an end was connected to an electrode padA sealing agent which covered a part of semiconductor deviceelectrode padand metal lead and in which a metal lead has been arranged along the sideIt is vertically arranged to a wiring board side on the side of a hole of a wiring board which has a hole which inserts in a semiconductor device and is fixedand a wiring boardand has a terminal area connected with a metal lead. A wiring board holds connection between a metal lead and a terminal area in an attachment component which consists of material of a rate of low thermal expansionand a rate of high elasticity. An attachment component is widely connected on a wiring board and a semiconductor device.
[0007]A manufacturing method of a semiconductor device concerning this invention is covered with low melting point wax material in a metal core wire of high conductivityA process of irradiating low melting point wax material and a metal core wire with laser of a wavelength band which does not give a damageand removing pre-insulation material at the end of a metal lead furthermore covered with pre-insulation material in the outermost surfaceA semiconductor device which has an electrode pad is carried in a chip carrier which has a part holding other ends of a metal lead which can be solderedand it is made to manufacture including a process of joining an electrode pad to an end from which pre-insulation material of a metal lead was removed with a wire bond device. Where a

semiconductor device is carried in this chip carrier using a chip carrier which has the projection for cutting a metal leadIt is made to manufacture including a process of cutting a metal lead by which one end was connected to an electrode pad of a semiconductor deviceand the other end was connected to a part of a chip carrier which can be soldered using a cutting tool with which a projection and a wire bond device were equipped. A chip carrier which has mutually disengageable semiconductor mounting parts and a part which can be soldered is usedIt is made to manufacture including a process of heating only a part which can be soldered after using a chip carrierperforming flattening of removal of a metal leadand a part which can be soldered which remainedand performing defecation by plasma further.

[0008]A process of connecting a metal lead to an electrode pad on a semiconductor deviceand closing a part of semiconductor deviceelectrode padand metal lead with a sealing agent which is thermoplastic resinIt is made to manufacture including a process of fabricating a metal lead in the sealing agent exterior so that the side of a sealing agent may be met with a metal lead bending metallic moldand a process which embeds a part of metal lead into a sealing agent with a metallic mold which can be heatedand is fixed. A process which heats a wiring board which has a hole which mounts a semiconductor device and to which a hole is expandedA semiconductor device is inserted in a hole and it is made to manufacture including a process of joining a metal lead arranged on the side of a semiconductor device to a terminal arranged on the side of a holeand a process which cools a wiring board after semiconductor device mountingand shrinks a hole. Form a metal sphere at a tip of a metal lead joined to an electrode pad of a semiconductor deviceand a semiconductor devicean electrode padand a metal lead with a sealing agent A wrap processLaser removes a sealing agenta metal sphere at the tip of a metal lead is exposedand it is made to manufacture including a process of defecating the metal sphere surfaceand a process of arranging height of a metal sphere using a leveling tool.

[0009]A manufacturing installation of a semiconductor device concerning this invention inserts a semiconductor device in a hole established in a wiring boardA bonding head which is a device which joins a metal lead arranged on the side of a terminal arranged on the side of a holeand a semiconductor deviceholds a semiconductor deviceand has heatingapplication of pressureand an ultrasonic impression mechanismA wiring board is carriedpositioning with a bonding head is performedand it has a stage which has a heating machine style for making a hole of a wiring board expand. It has a stage in which a semiconductor device is

carrieda bonding tool which joins a metal lead to an electrode pad of a semiconductor deviceand laser which cuts a metal lead and forms a metal sphere in an amputation stump by the side of a semiconductor device at least.

[0010]

[Embodiment of the Invention]

Embodiment 1. drawing 1 is a sectional view showing the composition of the semiconductor device in the embodiment of the invention 1. In a figurethe semiconductor device for which 1 is generally usedthe electrode pad in which 1a was formed on the semiconductor device 1and 2 show a metal leadand 3 shows a sealing agentrespectively. The semiconductor device by this embodiment performs the electrical signal input of the electrode pad 1a on the semiconductor device 1and the exterior only by the metal lead 2without using the leadframe and TAB tape which have been used conventionally.

[0011]Belowthe composition and the manufacturing method of a semiconductor device by the embodiment of the invention 1 are explained. The section of the metal lead 2 is almost circularand the thing of 50 - 100um can be used for the diameter according to the interval of the electrode pad 1aor desired package size. As a connection methodwire bond artsuch as wedge bonding art joined with a wire and ball bond art which forms a ball in a wire top endis used. Auand Ag and Cu other than aluminum can be used for the charge of a principal member of the metal lead 2. The semiconductor device 1 can be closed using the sealing agents 3such as a resin materialand the semiconductor device shown in drawing 1 can be manufactured. as the metal lead 2 -- not only a metal lead simple substance but **?** -- the metal lead 2 which covered the low melting point wax material 2a may be used for the surface like. As a joining method of the metal lead 2 in this casethe micro soldering art of using a metaled melting phenomenon in addition to above-mentioned wire bond art can be used. In order to improve the insulation between metal lead 2 and between the metal lead 2 and the semiconductor device 1the metal lead 2 which gave pre-insulation material 2b as shown in drawing 3 to the outermost layer side may be used. In this casein order to remove pre-insulation material 2bthe wire bond device carrying laser is used. The wavelength of laser is chosen from the range which can remove pre-insulation material 2b and does not have on the low melting point wax material 2a and the metal lead 2. Using the laser of this wavelength bandas shown in drawing 4by removing pre-insulation material 2bbefore junction to the electrode pad 1astabilization of junction of the electrode pad 1a and the metal lead 2 is attainedand reliability

improves.
[0012]In the process of connecting the metal lead 2 to the electrode pad lathe chip carrier 4 shown in drawing 5 is used. The chip carrier 4 can carry the semiconductor device 1 more than a piece. The chip carrier 4 has the part 4a which can be solderedcan connect and hold the end of the metal lead 2and can fabricate the metal lead 2 with the advanced positioning accuracy which a wire bond device has. The process of cutting the metal lead 2 using the cutting tool 5 with which the wire bond device was equipped is easily realizable by forming the projection 4b as shown in drawing 6 in the chip carrier 4. As shown in drawing 7the chip carrier 4 may be constituted so that it can separate into the main carrier 4c holding the semiconductor device land the subcarrier 4d which has a part which can be soldered. In this caseas only the subcarrier 4d is supplied to a chip carrier cleaning device and it is shown in drawing 8the metal lead 2 which remains in the part 4a which can be soldered can be removedand flattening of the part 4a surface which can be solderedand defecation can be performed further. The art of dissolving and making the metal lead 2 seceding from the part 4a which can be soldered is used for removal of the metal lead 2 by contact and atmosphere heating with the heater 6. At this timeflattening of the part 4a surface which can be soldered can be performed simultaneously. The plasma 7 can be used for defecation of the surface of the part 4a which can be soldered.
[0013]The semiconductor device in this embodiment can also take the gestalt which has the insulation material 8 as shown in drawing 9. As for the thickness of the insulation material 8at this timeit is desirable to make it larger than the diameter of the metal lead 2. With the insulation material 8the insulation between metal lead 2 increases and reliability improves. The manufacturing process of the semiconductor device which has the insulation material 8 is shown in drawing 10. Firstthe semiconductor device 1 which connected the metal lead 2 is carried in the compression bonding stage 10 (drawing 10 (a))The crimping tool 9 which held the insulation material 8 from the upper part can be droppedit can pressurize by the ability to heat them between the compression bonding stage 10 and the crimping tool 9as the metal lead 2 and the insulation material 8 are put (drawing 10 (b))and the metal lead 2 can be wrapped in the insulation material 8. As the insulation material 8the thermoplastic resin easily softened with heating can be used. As the gestaltwhat was beforehand processed into the sheet shaped can be used. Liquefied resin can also be usedand it supplies with a feed unit (not shown) separatelyor supplies from the crimping tool 9. Although this example showed the manufacturing process in case the

semiconductor device 1 has the electrode pad 1a in the upper partit is feasible by a method with the same said of the case where it has on the lower part or the side. Thenby clamping an insulation material portiona sealing process can be performed easily and a device (not shown) can be conventionally used like a package conventional leadframe type. The metal lead 2 is cut beforehandand since there is no excessive support membera lead machining process can be simplified conventionally.
[0014]As mentioned abovesince it was made to perform the electrical signal input of the electrode pad 1a on the semiconductor device land the exterior only by the metal lead 2 according to this embodimentflexibility is high and it is possible to provide a micro semiconductor device. The conventional manufacturing installation can be usedfor a certain reasona manufacturing cost is held down and the process simplified further can also be manufactured cheaply.
[0015]Embodiment 2. drawing 11 is a sectional view showing the composition of the semiconductor device in the embodiment of the invention 2. Identical codes are given to the same and a considerable portion among a figureand explanation is omitted. The metal lead 2 is arranged along the side of the sealing agent 3a part of metal lead 2 is embedded into a sealing agentand the semiconductor device by this embodiment is being fixed. Drawing 12 is used for below and a manufacturing process is explained to it. The semiconductor device 1 by which the metal lead 2 which has the insulation material 8 was connected to the electrode pad 1a like the above-mentioned Embodiment 1 is closed with the sealing agent 3 which is thermoplastic resin (drawing 12 (a)(b)). This is carried in the stage 12and it fabricates so that the outside of the sealing agent 3 may be about met in the metal lead 2 with the 1st metallic mold 11 and the 2nd metallic mold 13 (drawing 12 (c)(d)). Thenusing heating and the application-of-pressure metallic mold 14the metal lead 2 is embedded into the sealing agent 3and it fixes (drawing 12 (e)). By the above processthe semiconductor device shown in drawing 11 can be manufactured.
[0016]The semiconductor device by this embodiment serves as a further thin product by using the wiring board 15 shown in drawing 13although it is also possible to carry out a surface mount on the usual wiring board. Drawing 13 (a) is a top view of the wiring board 15and drawing 13 (b) is the A-B sectional view. The wiring board 15 has the semiconductor device mounted part 15a which is a hole for mounting a semiconductor deviceand has the wiring 15b which is a terminal area vertically arranged with the 15th page of the wiring board on the side. The semiconductor device by this embodiment can be mounted in the wiring board 15 using the mounting

device shown in drawing 14. As for this mounting deviceit is desirable to carry the semiconductor device packaging head 16 in which heatingapplication of pressureand supersonic vibration impression are possible. The semiconductor device packaging head 16 consists of the semiconductor device attaching part 16athe ultrasonic horn 16bthe ultrasonic vibrator 16cthe heater 16dand the pressurizing mechanism 17and possesses the power supply 19 for the heaters 16dand the vacuum generator 20 for vacuum absorption outside. The heater 18a is provided also in the stage 18 side holding the wiring board 15and the power supply 19 for the heaters 18a and the vacuum generator 20 for substrate maintenance are provided outside. Although the semiconductor device packaging head 16 and the stage 18 showed the example which is sharing the power supply 19 and the vacuum generator 20 by drawing 14it may prepare separately.

[0017]By using this semiconductor device packaging head 16a semiconductor device can be easily inserted in the semiconductor device mounted part 15a of the wiring board 15and contact of the wiring 15b and the metal lead 2 and connection can be made. At this timeby fully heating the wiring board 15 during mounting of a semiconductor devicethe semiconductor device mounted part 15a is expanded (drawing 15 (a))by cooling after mountingthe semiconductor device mounted part 15a contractsand the electrical link of the wiring 15b and the metal lead 2 is maintained. Thusa very thin product as shown in drawing 15 (b) is made. As shown in drawing 16in order to prevent degradation of the terminal area of the wiring 15b by expansion of the semiconductor device mounted part 15aand the metal lead 2 at this timethe attachment component 21 which consists of material of the rate of low thermal expansion and the rate of high elasticity may be connected to the wiring board 15. Whether adhesives' being used for the connection layer 22 and mechanical immobilization may be sufficient. In order to raise the efficiency which radiates generation of heat from a semiconductor device outsideas shown in drawing 17the attachment component 21 may be widely connected on the wiring board 15 and the semiconductor device 1. As a material of the attachment component 21it is desirable to make Mo etc. into the charge of a principal memberfor example. In order to raise thermal conductivitythe material in which it could laminate with material with high thermal conductivitysuch as Cuand Cu etc. were distributed may be used.

[0018]Embodiment 3. drawing 18 is a sectional view showing the composition of the semiconductor device in the embodiment of the invention 3. Identical codes are given to the same and a considerable

portion among a figureand explanation is omitted. The semiconductor device by this embodiment took out the metal lead 2 outside through the sealing agent 3 vertically from the field where the electrode pad 1a of the semiconductor device 1 is arrangedand formed the metallic bump 2c in the external end of the metal lead 2.

[0019]Drawing 19 and drawing 20 are the figures showing the manufacturing method of the semiconductor device of this embodimentandas for the metal sphere which serves as the metallic bump 2c 23 in a figure behinda bonding tool usual in 24and 25a leveling tool and 27 are leveling stages a bonding stage and 26. Firstas shown in drawing 19while using laser at the time of cutting of the metal lead 2 and cutting the metal lead 2 in desired height in the process of performing a wire bond using the bonding tool 24The wire bond device which can form the metal sphere 23 in the amputation stump by the side of the semiconductor device 1 of the metal lead 2 at least is used. The metal sphere 23 surface is defecated at the same time it wraps the whole in the sealing agent 3laser removes the surface sealing agent 3 for the business shown in drawing 20 and it exposes the metal sphere 23 after this process (drawing 20 (a)(b)). Thenthe height of the metal sphere 23 is arranged using the leveling tool 26 on the leveling stage 27 (drawing 20 (c))and let this be the metallic bump 2c (drawing 20 (d)). By the above methodit is micro and the metallic bump 2c can get the semiconductor device used as field arrangement easily.

[0020]

[Effect of the Invention]As mentioned abovesince it was made to perform the electrical signal input of the electrode pad of a semiconductor deviceand the exterior only by a metal lead according to this inventionflexibility is high and it is possible to provide a micro semiconductor device cheaply.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a sectional view showing the semiconductor device which is this embodiment of the invention 1.

[Drawing 2]It is a sectional view showing the metal lead of the semiconductor device which is this embodiment of the invention 1.

[Drawing 3]It is a sectional view showing the metal lead of the semiconductor device which is this embodiment of the invention 1.

[Drawing 4]It is a sectional view showing the pre-insulation film

removal process on the surface of a metal lead of the semiconductor device which is this embodiment of the invention 1.
[Drawing 5]It is a sectional view showing the chip carrier used for manufacture of the semiconductor device which is this embodiment of the invention 1.
[Drawing 6]It is a sectional view showing the chip carrier used for manufacture of the semiconductor device which is this embodiment of the invention 1.
[Drawing 7]It is a sectional view showing the chip carrier used for manufacture of the semiconductor device which is this embodiment of the invention 1.
[Drawing 8]It is a sectional view showing the cleaning method of a chip carrier used for manufacture of the semiconductor device which is this embodiment of the invention 1.
[Drawing 9]It is a sectional view showing the semiconductor device which is this embodiment of the invention 1.
[Drawing 10]It is a sectional view showing the manufacturing method of the semiconductor device which is this embodiment of the invention 1.
[Drawing 11]It is a sectional view showing the semiconductor device which is this embodiment of the invention 2.
[Drawing 12]It is a sectional view showing the manufacturing method of the semiconductor device which is this embodiment of the invention 2.
[Drawing 13]It is the top view and sectional view showing the wiring board which mounts the semiconductor device which is this embodiment of the invention 2.
[Drawing 14]It is a figure showing the mounting device for mounting the semiconductor device which is this embodiment of the invention 2.
[Drawing 15]It is a figure for explaining the mounting step of the semiconductor device which is this embodiment of the invention 2.
[Drawing 16]It is a sectional view which is this embodiment of the invention 2 and in which showing the semiconductor device after mounting in a wiring board.
[Drawing 17]It is a sectional view which is this embodiment of the invention 2 and in which showing the semiconductor device after mounting in a wiring board.
[Drawing 18]It is a sectional view showing the semiconductor device which is this embodiment of the invention 3.
[Drawing 19]It is a sectional view showing the manufacturing installation of the semiconductor device which is this embodiment of the invention 3.
[Drawing 20]It is a sectional view showing the manufacturing process of

the semiconductor device which is this embodiment of the invention 3.
[Drawing 21]It is a top view showing the semiconductor device using the conventional leadframe.
[Drawing 22]It is a top view showing the semiconductor device using the conventional TAB tape.
[Drawing 23]It is a sectional view showing the electrode pad of the conventional semiconductor device.
[Drawing 24]It is a sectional view showing the conventional semiconductor device.
[Drawing 25]It is a sectional view showing the conventional semiconductor device.
[Description of Notations]
1 A semiconductor device1a electrode pad2 metal leadsand 2a Low melting point wax material2b Pre-insulation material2c metallic bumpand 3 A sealing agent and 4 Chip carrier4a The part which can be solderedand 4b A projection4c main carrierand 4 d Subcarrier5 A cutting tool and 6 A heater and 7 Plasmaeight insulation materials9 crimping tools10 A compression bonding stage and 11 The 1st metallic mold and 12 A stage and 13 The 2nd metallic mold14 Heatingan application-of-pressure metallic moldand 15 A wiring board and 15a Semiconductor device mounted part15b Wiring and 16 A semiconductor device packaging head and 16a Semiconductor device attaching part16b An ultrasonic horn and 16c An ultrasonic vibrator and 16 d Heater17 A pressurizing mechanism and 18 A stage and 18a A heater and 19 Power supply20 A vacuum generator and 21 An attachment component and 22 A connection layer and 23 Metal sphere24 A bonding tool and 25 [A leveling tool and 27 / A leveling stage and 28 / A vamp38 metal bases.] An inner lead2931 electrode padsand 30 and 36 A lead32 UBMand 3335 and 39 A bonding stage and 26